CLAIMS

What is claimed is:

Claim 1. A method for limiting current and voltage in a PM electric machine comprising:

receiving a voltage command indicative of a desired position control;

obtaining a velocity value indicative of a rotational velocity of said electric machine;

computing a first voltage threshold for said electric machine based on a selected operating condition; and

if said voltage command exceeds said first voltage threshold, establishing a modified voltage command as substantially equivalent to said first voltage threshold, otherwise establishing a modified voltage command as substantially equivalent to said voltage command.

Claim 2. The method of Claim 1 wherein at least one of said voltage command said first voltage threshold, and a second voltage threshold is based on temperature.

Claim 3. The method of Claim 1 wherein said first voltage threshold corresponds to a selected maximum voltage for said electric machine at said selected operating condition.

Claim 4. The method of Claim 3 wherein said selected operating condition includes a velocity of said electric machine.

Claim 5. The method of Claim 3 wherein said selected operating condition includes a rated torque profile of said electric machine.

Claim 6. The method of Claim 1 further including computing a second voltage threshold for said electric machine based on another selected operating condition; and

if said voltage command is less than said second voltage threshold, establishing said modified voltage command as substantially equivalent to said second voltage threshold, otherwise establishing said modified voltage command as substantially equivalent to said voltage command.

Claim 7. The method of Claim 6 wherein said second voltage threshold corresponds to a selected minimum voltage for said electric machine at said another selected operating condition.

Claim 8. The method of Claim 7 wherein said another selected operating condition includes a velocity of said electric machine.

Claim 9. The method of Claim 7 wherein said another selected operating condition includes a rated torque profile of said electric machine.

Claim 10. A system for limiting current and voltage in a PM electric machine comprising:

a PM electric machine;

a position sensor configured to measure a position of said electric machine and transmit a position signal;

a controller, said controller in operable communication with a voltage source and said electric machine and said position sensor, said controller computing a voltage command responsive to a desired position control;

wherein if said voltage command exceeds a first voltage threshold, said controller establishes a modified voltage command as substantially equivalent to said first voltage threshold, otherwise said controller establishes a modified voltage command as substantially equivalent to said voltage command.

Claim 11. The system of Claim 10 further including an inverter in operable communication between said voltage source and said electric machine, said inverter also in operable communication with said controller and configured to generate a phase voltage to said motor based on said modified voltage command.

Claim 12. The system of Claim 10 wherein at least one of said voltage command, said first voltage threshold, and a second voltage threshold is based on temperature.

Claim 13. The system of Claim 10 wherein said first voltage threshold corresponds to a selected maximum voltage for said electric machine at a selected operating condition.

Claim 14. The system of Claim 13 wherein said selected operating condition includes a velocity of said electric machine.

Claim 15. The system of Claim 13 wherein said selected operating condition includes a rated torque profile of said electric machine.

Claim 16. The system of Claim 10 further including: if said voltage command is less than a second voltage threshold, said controller establishes said modified voltage command as substantially equivalent to said second voltage threshold, otherwise said controller establishes said modified voltage command as substantially equivalent to said voltage command.

Claim 17. The system of Claim 16 wherein said second voltage threshold corresponds to a selected minimum voltage for said electric machine at said another selected operating condition.

Claim 18. The system of Claim 17 wherein said another selected operating condition includes a velocity of said electric machine.

Claim 19. The system of Claim 17 wherein said another selected operating condition includes a rated torque profile of said electric machine.

Claim 20. A system for limiting current and voltage in a PM electric machine comprising:

a means for receiving a voltage command indicative of a desired position control;

a means for obtaining a velocity value indicative of a rotational velocity of said electric machine;

a means for computing a first voltage threshold for said electric machine based on a selected operating condition; and

if said voltage command exceeds said first voltage threshold, a means for establishing a modified voltage command as substantially equivalent to said first voltage threshold, otherwise a means for establishing a modified voltage command as substantially equivalent to said voltage command.

Claim 21. A storage medium encoded with a machine-readable computer program code for limiting current and voltage in a PM electric machine, said storage medium including instructions for causing controller to implement a method comprising:

receiving a voltage command indicative of a desired position control;

obtaining a velocity value indicative of a rotational velocity of said electric machine;

computing a first voltage threshold for said electric machine based on a selected operating condition; and

if said voltage command exceeds said first voltage threshold, establishing a modified voltage command as substantially equivalent to said first voltage threshold, otherwise establishing a modified voltage command as substantially equivalent to said voltage command.

Claim 22. A computer data signal embodied in a carrier wave for limiting current and voltage in a PM electric machine, said data signal comprising code configured to cause a controller to implement a method comprising:

receiving a voltage command indicative of a desired position control;

obtaining a velocity value indicative of a rotational velocity of said electric machine;

computing a first voltage threshold for said electric machine based on a selected operating condition; and

if said voltage command exceeds said first voltage threshold, establishing a modified voltage command as substantially equivalent to said first voltage threshold, otherwise establishing a modified voltage command as substantially equivalent to said voltage command.